

REMARKS

Applicants have deleted the incorporation by reference language in the "Cross Reference of Related Application" section at page 1 of the Specification. Applicants have also amended claims 9, 11 and 16 to promote clarity.

Claims 3-4 and 6-19 are currently pending. Reconsideration of this application, as amended, is respectfully requested in view of the remarks below.

Rejection under 35 U.S.C. § 112, second paragraph

The Examiner rejects claims 9, 11 and 16 as being indefinite. See the Office Action, page 3, lines 7-16.

More specifically, the Examiner rejects claim 9, asserting that "it is not clear what is intended by 'tristhylamine.'" Applicants have replaced "tristhylamine" with "trithyl amine." The Examiner further rejects claim 11, asserting that "in claim 11, line 7, the word 'type' in the phrase 'ethylene oxide added type triethylpropane triacrylate' renders the definition of the compound indefinite." Applicants have replaced "ethylene oxide added type triethylpropane triacrylate" with "ethoxylated triethylol propane triacrylate." Finally, the Examiner rejects claim 16, asserting that "it is not clear what is meant by 'and is prepared for providing the surface slipping characteristics.'" Applicants have deleted "and is prepared for providing the surface slipping characteristics."

Applicants submit that that this rejection has been overcome by the above amendments.

Rejection under 35 U.S.C. § 103(a)

I

Claims 3, 4, 6-9 and 11-19 are rejected as being unpatentable over Duecker (U.S. Patent 6,122,428) in combination with Szum (U.S. Patent 6,110,593). Among the rejected claims, claims 3, 6-9 and 11-14 depend from claim 4, which covers a resin composition. Claims 15-16 are drawn to a method of preparing a resin for manufacturing optical fiber ribbon with the resin

composition of claim 4. Claims 17-19 are drawn to a resin prepared by the method of claim 15. Claim 4, the broadest resin composition claim, will be discussed first.

Claim 4 covers a resin composition including (a) a photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane (PDMS), (b) a monomer, (c) a photoinitiator, (d) a leveling/defoaming agent, and (e) an antioxidant. In this composition, the urethane acrylate oligomer is synthesized from a mixture, including i) a first polyol containing PDMS, ii) a second polyol, iii) a polyisocyanate, iv) an acrylate alcohol, v) a urethane reaction catalyst, and vi) a polymerization inhibitor. The first polyol is in an amount of 5 to 25 weight% of the urethane acrylate oligomer.

The urethane acrylate oligomer recited in claim 4 includes four moieties: the first PDMS-containing polyol (A), the second polyol (B), the polyisocyanate (C), and the acrylate alcohol. The polyols A and B are linked by the polyisocyanate C to form a linear backbone, which is terminated by the acrylate alcohol. The backbone thus obtained is a series of **three-component copolymers**, which have structures, such as -C-A-C-B-C-, -C-B-C-A-C-B-C-, -C-A-C-B-C-A-C-B-C-, ... etc. Note that the **PDMS moiety is embedded in the three-component copolymer backbone** as the whole or part of A.

Duecker teaches a radiation curable composition, which comprises "a **polyether-based** urethane acrylate that, in a preferred embodiment, is silicon-modified ... a monomer, a photoinitiator and a stabilizer" (the Office Action, page 4, lines 1-3). Although Duecker teaches that the urethane acrylate can be silicon-modified, the silicon-modified urethane acrylate is **polyether-based**. That is, it is a **one-component polymer** that includes an ether group in each repeat moiety in the backbone (e.g., $-(CH_2-O-CH_2)_n-$). Duecker is silent on a silicon-containing moiety, let alone a PDMS moiety, being embedded in the backbone.

Szum teaches optical fiber primary coating systems having a glass coupling moiety, a slip agent moiety, and at least one radiation curable moiety. The radiation curable moiety includes a radiation curable oligomer, a reactive diluent, a photoinitiator and additives. Example 1-1 of Szum describes conventional synthesis of a PDMS-containing urethane acrylate oligomer, i.e., a reaction involving a PDMS diol (A), a diisocyanate (C), an inhibitor, and a catalyst. The

radiation curable oligomer thus obtained has a **two-component** backbone structure: -C-A-C-, -C-A-C-A-C-, ... etc. Again, Szum is silent on a silicon-containing moiety, let alone a PDMS moiety, being embedded in the backbone.

Neither Duecker nor Szum teaches or suggests a urethane acrylate having a **three-component copolymer backbone**, in which **a PDMS containing moiety is embedded**.

Therefore, the Examiner has failed to establish a *prima facie* case of obviousness.

Even if a *prima facie* case of obviousness has been made (which Applicants do not concede), it can be successfully rebutted by a showing of unexpected advantage of the claimed resin. See Mr. Se Lee Chang's Declaration, attached hereto as "Exhibit A." Tables 1-3 of the Declaration show that 7 resins of this invention had smaller friction forces, smaller surface tensions, higher tensile strengths, and lower shrinkages than the resin prepared from EBECRYL 4842 (a polyether urethane acrylate oligomer disclosed in Duecker, the primary reference). Of note, it is preferred that resins for manufacturing optical fiber ribbon have smaller friction forces, smaller surface tensions, higher tensile strengths, and lower shrinkages so as to minimize optical loss. See page 1, lines 15-18. Further, Table 4 of the Declaration shows that the 7 resins were transparent and remained homogenous for more than 48 hours, while two resins consisting of H-I-Hsi2111-I-M (a composite oligomer disclosed in Szum, the secondary reference) were hazy and became heterogeneous within 3 hours. In view of these unexpected advantages, claim 4 is clearly not rendered obvious by Duecker and Szum.

For the same reasons set forth above, claims 3, 6-9 and 11-19, each reciting the resin composition of claim 4, are also nonobvious over Duecker and Szum.

II

Claims 3, 4, and 6-19 are rejected as being unpatentable over Duecker in view of Shustack (U.S. Patent 5,908,873), and further in view of Ohtaka (U.S. Patent 5,787,218). Again, claim 4, the broadest resin composition claim, will be discussed first.

Duecker has been described above.

Shustack teaches a radiation curable composition, which, according to the Examiner, includes “an aliphatic urethane acrylate oligomer, such as silicone-modified EBECRYL4842, a reactive monomer, a release agent, a photoinitiator and an antioxidant” (the Office Action, page 6, lines 12-14). Shustack also teaches the composition of the aliphatic urethane acrylate oligomer including “polyols, polyisocyanate, hydroxyalkyl(methyl)acrylate and a urethane catalyst” (the Office Action, page 6, lines 16-17).

As described above, the patentability of claim 4 resides at least in part in the composition of a urethane acrylate oligomer, which has a **PDMS-embedded three-component copolymer backbone**. Neither Duecker nor Shustack teaches or suggests a urethane oligomer which has such a backbone. Neither does their combination. Therefore, claim 4 is not rendered obvious by Duecker and Shustack.

Ohtaka teaches a liquid curable resin composition including a urethane acrylate, a polymerizable mono-functional vinyl monomer, and a polymerization initiator. The urethane acrylate is synthesized from a polyol, a diisocyanate and a (meth)acrylate. Ohtaka also teaches that a second polyol can be included in the urethane oligomer. However, Ohtaka does not teach or suggest a PDMS-embedded three-component copolymer backbone. As discussed above, neither does Duecker nor Shustack. As Ohtaka does not cure the deficiency, its combination with Duecker and Shustack does not render claim 4 obvious.

In other words, the Examiner has failed to establish a *prima facie* case of obviousness against claim 4 as well as claims 3, and 6-19, each reciting the resin composition of claim 4. Even if a *prima facie* case of obviousness has been made (which Applicants do not concede), it can be successfully rebutted by a showing of unexpected advantages of the claimed resin over Duecker, the primary reference. See discussion *supra* on Tables 1-3 of the Declaration. Given these unexpected advantages, claim 4, as well as claims 3, and 6-19, is clearly not rendered obvious by Duecker in view of Shustack and Ohtaka.

Applicant : Se-Lee Chang et al.
Serial No. : 09/690,271
Filed : October 17, 2000
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Attorney's Docket No.: 12495-002001 / OPP 000621 US

CONCLUSION

For the reasons set forth above, Applicants submit that the grounds for the rejections asserted by the Examiner have been overcome, and that the claims, as pending, define subject matter that is nonobvious over the prior art. Applicants ask that all claims be allowed.

Enclosed is a \$110 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 8-7-03

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